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ABSTRACT

Distance teaching of online searching poses a number of problems especially with regard to its practical aspects. The principles of sound instructional design and technological developments can, however, be used to develop a multimedia study package that can solve these problems and be used to teach end-users, information specialists as well as Information Science students. At the University of South Africa (Unisa), the Department of Information Science uses a multimedia study package to teach online searching and to make students aware of teaching principles. The Library Service offers online training courses for their end-users. Combining the experience and expertise of the Department and of the Library, the objective is to develop a multimedia study package that allows for independent study where the student need attend only the practical sessions. The application of instructional design to the study package is explained and examples are given of the content, objectives, learning events, teaching methods and media combinations. The study package is suitable for different levels of online searching and for people from both developed and under-developed environments. It also caters to adult learners' interests. The proposed package includes the use of printed media, videos, practical exercises, workshops, e-mail and use of the Internet. The package is based on the characteristics of distance teaching and multimedia study packages. (Contains 14 references.) (Author)

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Distance teaching in online searching

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Abstract: Information specialists of the future will have to improve their online searching as well as teaching skills. The latter are necessary to train the growing number of end-users. Distance teaching of online searching poses a number of problems especially with regard to its practical aspects. The principles of sound instructional design and technological developments can, however, be used to develop a multimedia study package that can solve these problems and be used to teach end-users, information specialists as well as Information Science students. At the University of South Africa (Unisa), the Department of Information Science uses a multimedia study package to teach online searching and to make students aware of teaching principles. The Library Service offers online training courses for their end-users. Combining the experience and expertise of the Department and of the Library, the objective is to develop a multimedia study package that allows for independent study where the student need attend only the practical sessions. The application of instructional design to the study package is explained and examples are given of the content, objectives, learning events, teaching methods and media combinations. The study package is suitable for different levels of online searching and for people from both developed and under-developed environments. The interest of adult learners is also catered for. The proposed package includes the use of printed media, videos, practical exercises, workbooks, computer aided instruction, workshops, e-mail and use of the Internet. The package is based on the characteristics of distance teaching and multimedia study packages.

Keywords: distance teaching, end-user training, Internet, online searching, multimedia study packages, South Africa

1. Introduction

The working environment of information specialists has changed and with it the kinds of tasks they perform. Today they must be able to conduct complicated online searches, and design and evaluate databases and database programmes. Furthermore they need to use the Internet, keep track of new developments in the online industry and train the growing number of end-users to use the wide variety of information sources and services available. Information specialists of the future should therefore not only master the more difficult skills of online searching, they should also develop teaching skills. A positive attitude and adaptability to their ever-changing working environment is important.

Teaching skills are not covered in most library science programmes. The Department of Information Science at the University of South Africa (Unisa), however, developed a multimedia study package for the distance teaching of online searching to undergraduate students in which teaching skills are emphasised. The package is designed to address the more difficult aspects of online searching and to stimulate students' interest in the online industry.

The Unisa Library has identified the need to train their growing number of end-users. At present the library presents workshops in online searching to academic, research and administrative staff. Most of the Library's student users, however, study by means of distance education and seldom visit the main library. Training programmes for these users need therefore to be offered by means of distance teaching.

Since the Department of Information Science is already using a multimedia study package it was decided to unite efforts in order to develop a programme to be used within the context of distance teaching catering for the needs of people from different backgrounds. The Department's expertise in instructional design and distance teaching and the Library's experience in online searching would complement each other. In order to support cooperation, all the Library staff responsible for end-user training attended courses presented by the Department to refine their searching and teaching skills. Both parties also emphasise the necessity to keep abreast of new developments.

Our point of departure is that distance teaching poses problems in addressing the *practical skills* of online searching. Technological developments and sound instructional design can be used to design study packages to overcome these problems. Since a multimedia study package offers the ideal solution it will be explained how instructional design is applied in the creation of such a package. The package can be adapted to the training of library, academic and research staff, distance users and information science students. Furthermore, it offers a solution to the problems experienced by users from widely differing educational backgrounds.

2. Distance teaching

Distance teaching differs from conventional or face-to-face teaching. It is not based on the attendance of classes, although there are some distance teaching courses that include a number of attendance sessions. The different approaches to distance teaching are discussed in Refs 10, 11 and 13. Distance education is based on the geographic separation between the student and the teacher. There are also other characteristics:

- although the student is geographically separated from the teacher and teaching institution, contact sessions such as workshops or video conferences may occasionally be offered. Such classes should however not cover too much of the study time and should be planned only for those aspects that *cannot be taught in any other way* (e.g. *practical online searches*);
- the teaching institution supports the students through the planning and development of study programmes, and it provides for the evaluation of the student's performance. It also provides guidelines, motivation and other forms of support. The distance library offers similar support in providing access to information sources;
- distance students are mostly (working) adults studying separately from each other. This should be recognised in the teaching approach. The needs, backgrounds, age groups and experience of the students should be catered for (their subject interests in online searching, for example, will differ). Although adults prefer to study independently they also need support and guidance in their studies;
- any technological media can be used, ranging from the printed media to video conferences, computer-assisted instruction and the Internet;
- although distance teaching is based on one-way communication in which the study material is sent to students, there should also be opportunities for the students to communicate with teachers and their fellow students. The latter (two-way communication) can especially be improved by means of interactive technology such as the Internet (Ref 6).

Owing to its characteristics, distance teaching offers benefits especially to working adults, people unable to attend classes, countries where geographical distances influence teaching opportunities and subject areas requiring in-service training. The benefits include overcoming geographical barriers, enabling students to continue with other responsibilities, financial benefits and allowing students to study according to their own time schedule, pace and learning style. These benefits will not be dealt with here since more information can be found in Refs 1, 2, 3, 8 and 9. These benefits should be considered when planning a *true* distance teaching programme, especially when planning for practical sessions.

2.1. Unisa environment

Unisa practises distance teaching according to the characteristics sketched above. Attendance sessions are kept to a minimum and students receive all their study material in the form of study guides and tutorial letters. Sometimes additional media are included: for example, audio cassettes, videos and computer-assisted tutorials.

The Unisa Library renders an information service to approximately 3000 academic, research and administrative staff on campus as well as to approximately 30,000 off-campus or remote students. An extensive and high-quality information service is offered by a team of subject librarians to postgraduate students from honours through to doctoral level. Information searches are conducted on request for these students, using all available sources. Almost all contact is by means of mail, e-mail or telephone and students need not visit the Library. All books, periodical articles and other material can be sent to students by mail. Unisa has the largest academic library in South Africa with 279 staff members. The Library is fully-computerised and makes extensive use of local and overseas databases, e-mail and the Internet. It has a computerised catalogue and a campus-wide CD-ROM network with 42 databases available. There are branch libraries in five areas of the country which supply material needed by undergraduate students. Although these branch libraries are connected to the university network, they do not have access to the CD-ROM network or the Internet.

In the light of changes in the online industry, the Library has embarked on programmes of end-user training because it felt it was important to promote these essential life skills. If the problems encountered by distance teaching are overcome, an important contribution can be made to the information skills of the working adult.

Apart from the typical problems of distance teaching (such as studying in isolation, lack of communication, difficulty in attending practical sessions, catering for heterogeneous groups), Unisa has the additional challenge of both students and staff coming from widely differing environments. Some are highly computer and library literate while others have never been into a library or worked with a computer before. Most South Africans do not have access to a computer. In some parts of South Africa there is no electricity, while some of the urban companies and universities have access to the latest technology. The ideal is to present training programmes to

enable people from both ends of the spectrum to master basic as well as sophisticated online searching skills and to help them gain the necessary computer skills required for online searching.

Recently Unisa's policy was adapted to allow for the use of basic (print-based) study packages as well as for the use of advanced technology for those students in a position to make use of it. There is however to be no discrimination between students with regard to opportunities for passing the examinations. Since mid-1996, Unisa also started using the Internet as an *optional* medium for the delivery of study material and the submission of assignments. The Internet option (called Students Online, or SOL) also allows remote access by students to the library catalogue and stimulates interaction between students and lecturers.

Bearing the characteristics of distance teaching in mind, as well as the University's policy on the use of technology, the Teaching Department and the Library decided that a multimedia study package would allow us to train different target groups at Unisa, namely:

- Information Science students;
- library staff;
- academic, research and administrative staff;
- students (undergraduate as well as postgraduate).

A study package for post-graduate students is being developed.

Since we are dealing with training programmes, the term 'students' (and not library users) will be used to refer to members from the different target groups.

The advantage of a multimedia study package is that it can allow the distance student to:

- study independently but with the support of the teaching institution;
- gain the prerequisite knowledge and skills;
- master theoretical aspects underlying the practical work without access to advanced technology;
- study at their own pace;
- study according to their own style of learning;
- evaluate their own progress;
- use a variety of media;
- communicate with other students when necessary;
- complete separate modules according to their own interest.

A multimedia study package can also allow for occasional workshops that the student attends or for other forms of practical work. The idea is however that the student should be well-prepared and that workshops *et cetera* should focus on imparting practical experience in online searching and not on lecturing.

The following developments at Unisa will also support the use of a multimedia study package as more students gain access to computers:

- more study centres are to be built all over the country;
- the Library is planning an electronic classroom on the main campus;
- the possibility of allowing students access to computers at community centres is negotiated.

Although every effort is made to increase students' access to computers (and therefore the opportunity to practise online searching skills), it must be emphasised that the approach we have adopted is based on the recognition that:

- most of our students are computer and library illiterate;
- most of our students do not have access to computers;
- there are different target groups with different levels of interest in online searching;
- the advantages of distance teaching should be borne in mind (i.e. the training programmes should not be based on attendance classes).

Bearing the above-mentioned aspects in mind, we also feel sure that the theoretical principles on which the proposed study package is based will also be relevant for more highly developed countries.

To design a study package catering for the conditions that have been sketched, sound instructional design, the use of available technology and knowledge of the mode of distance teaching proved to be components of the solution.

3. Traditional approaches to online searching

Online searching has been taught since the early 1970s and a lot has been said about the learning content, objectives, possible learning events and the need for practical experience. A variety of methods can supplement practical sessions: computer aided instruction, demonstrations, emulations or simulations. There is, however, still a requirement to *practice with the real product*, like searching a database or developing a database.

Recent developments have also made it necessary to debate the concept of 'online searching' — does it include CD-ROM searching and Internet searching? Our point of departure is that online searching is the generic

concept, including searching through different media, on local or remote databases. Internet searching is included but should be based on the basic principles of online searching. In this approach the Internet is taught alongside other types of online searching.

There is however little evidence of the use of instructional design, including the recognition of the needs of the working adult learner and the use of distance teaching methods in the literature. Our experience at Unisa may therefore contribute to a better understanding of distance teaching in online searching.

In 1995 the Library started upgrading its staff's online searching skills, before presenting workshops to the academic and research staff. The workshops covered searching on Sabinet as well as using the Internet. In 1996 workshops for the same target group in CD-ROM searching were introduced. When developing a study package for other Unisa users, the approach followed for Information Science students will be adopted: that is, viewing the Internet as one of the many types of online searching. It is anticipated that in time the library staff training will follow this approach.

4. Instructional design

The value of instructional design for distance teaching has been well argued elsewhere (Refs 7, 9). Instructional design is regarded as '... the process of specifying conditions of learning. Its purpose is to create strategies and products at the macro level, such as programs and curricula, and at the micro level, such as lessons and modules' (Ref 14). It requires an instructional design model, of which a number have already been suggested in the subject literature for teaching in general, and for distance teaching in particular (Refs 4, 5). An instructional design model provides a set of logical steps which enable one to design training programmes based on the careful analysis of the situation and by applying didactic or teaching principles.

In instructional design, the specific teaching situation is analysed to identify the following:

- *the needs of the target group(s).* At Unisa we have more than one target group, which means that the programme will have to allow for different levels of sophistication. Information Science students and Library staff would be taught to do more advanced searches. They should also be introduced to the teaching principles underlying the design of the programme;
- *the entry level and background of the target group(s).* Do they know how to use a library; have they worked with a computer before; do they have access to a computer, *et cetera*. Depending on their existing skills, opportunities will have to be provided for them to gain prerequisite skills such as computer skills. At Unisa the Information Science students can attend an orientation lecture on computers where they work through a computer-assisted tutorial that includes sections on the use of a keyboard and the basic functioning of computers. Students are also advised to purchase the programme if they have access to a computer. Since practising librarians need to know more about the use of computers (e.g. basic DOS and Windows, and hard disk maintenance) a special course was planned for them. Similar methods will be followed to ensure that the other students will gain computer skills;
- *the technology to which the target group(s) have access.* Library staff and other Unisa staff have access to computers. Using the computer network to deliver the study material or for practising the online skills should therefore not be a problem. Most of the distance students, however, do not have access to a computer. Although the situation is improving, a training programme for students should be based on the use of printed media, (e.g. study guides or workbooks). Workshops should be organised to teach practical skills.

Instructional design involves more than deciding on whether to use printed media, computers or workshops to present the learning content. The importance lies in the logical presentation of the learning content and the use of performance objectives. It is also important to get students actively involved and to allow them to monitor their own progress. These as well as other things are catered for by multimedia study packages.

The crux of the design of a distance teaching programme therefore rests on the following aspects:

- effective use of the possibilities that are offered by the characteristics of distance teaching (e.g. including occasional workshops);
- the application of sound instructional design;
- taking into consideration the benefits offered by distance teaching (e.g. allowing the student to study in his own home, at his own pace and using media to which he has easy access);
- using multimedia study packages.

Following the principles of instructional design, the teaching programmes were first tested on smaller target groups (which are readily available) to provide feedback. The Library started with in-service training programmes for its own staff, followed by programmes for academic and research staff. Each course is evaluated by the participants. The Department workshops were evaluated and since 1996, students have been asked to evaluate the multimedia study package as a whole. This is done according to certain criteria which should also introduce students to the teaching principles underlying the design of the programme (e.g. the logical presentation of the content, media used, the use of performance activities, the inclusion of activities where the student had to do additional reading and answer some questions, the use of self-evaluation questions to monitor progress, and the support and motivation provided to students).

5. A multimedia study package

A multimedia study package was selected as the most appropriate after analysing:

- the subject content related to online searching and the skills involved;
- the characteristics of distance teaching;
- the needs and requirements of adult students (e.g. for subject related examples, studying independently and having the minimum imposition on their freedom and time).

Two approaches can be followed in defining multimedia study packages, namely:

- multimedia seen as a specifically designed way of combining sound, still and motion images, graphics and animation, and data and text together with the interactive capabilities of a computer (Ref 12);
- multimedia regarded as a teaching approach.

We consider multimedia as a teaching approach which also allows for the incorporation of the first-mentioned idea of multimedia. Looking at a multimedia study package as a teaching approach, the following characteristics should be acknowledged:

- it is an independent self-study package;
- it guides the student's independent activities (i.e. it provides guidelines for the use of the study package, the completion of activities, etc.);
- a variety of media is combined in a meaningful and well balanced manner;
- a number of learning events are included (watching a video, working through a CAI tutorial or attending a workshop);
- the student can monitor his own progress and knowledge of the work by means of self evaluation questions;
- the teaching institution supports the learner (by providing opportunities for mastering computer skills, improving access to technology and answering questions, etc.);
- each medium (a video, study guide or workbook) should be optimally used according to its characteristics (by providing visual displays or demonstrations or practising a certain skill);
- modules are used to allow for different interests and backgrounds.

When designing a multimedia study package it does not matter whether the study material is delivered in printed or in electronic form by means of the Internet. The emphasis is on *how* the media will be combined to support the above-mentioned characteristics. A variety of media are available with guidelines for selecting and combining them (Ref 5). It is important to bear in mind that only technology to which the target group has access can be used.

At Unisa we follow an approach largely based on the printed word. Other media are however also incorporated with the final requirement, namely that the student must attend a short practical session of not more than a week. As the availability of technology increases it will be possible to present workshops all over the country. Once students have access to the CD-ROM databases and the Internet from their homes, it would also be possible for them to complete the practical exercises on their own. It is however still important that they can call on the teaching institution for support.

6. Proposal for a multimedia study package

The proposal is based on sound instructional design which we considered as a non-negotiable prerequisite, considering the characteristics of both distance education and multimedia.

The following core topics apply to all the target groups: the process of information searching; identification and analysis of information needs; process of online searching; online industry and its components; databases and database categories; database structures; search strategy formulation; techniques for online searching; commands and protocol for specific products or forms of online searching (e.g. CD-ROM searching and Internet searching); evaluation of search strategies; database design; use of database programmes.

In addition to these, practising librarians and Information Science students learn about the evaluation of different products (databases, database vendors, database programmes and information retrieval systems); problems related to online searching and how to solve these; information services and the training of end-users. More advanced applications concerning the Internet (e.g. home page design) could also be added. The specific content and the level at which it should be presented will then be decided upon according to the target group, (academic staff, undergraduate students or Information Science students).

The order of presentation for the content should be based on a specific approach or teaching model. For Information Science students the Department uses the database approach as point of departure and with the library users the information need or research process is taken as point of departure.

Every multimedia study package would have an overall goal (i.e. what it wants to achieve), used to formulate the aims and performance objectives. The distance learner should always know what is expected of him and he should be able to monitor his own progress. For online searching, three types of performance objectives can be

distinguished, namely: what students should know (cognitive skills), what students should be able to do (psychomotor skills) and what their attitude should be (affective skills). As has been pointed out earlier on, it is very important that practising librarians and Information Science students should have a positive attitude toward ongoing developments in the online industry and that they should realise the importance of teaching skills. All students should also know the meaning of the concept 'online searching' and the different media used; they should be able to interpret a database structure and they should know how the database structure will influence the search results; they should know how to use one or more command languages or menu-driven systems and they should be able to use these systems on their own. They should also be able to formulate a search strategy. The above-mentioned are all based on theory which the student can master by means of printed media (e.g. study guides or workbooks). This can also be supplemented by the use of videos, video conferences including demonstrations, or computer-assisted tutorials which allow the student to practice certain skills until they are mastered.

As part of the study package there should be opportunities for students to monitor their own progress by means of self-evaluation questions. It is however very important that answers and explanations are provided as well. It should be remembered that the teacher is not physically present to answer the student's questions and the teacher should anticipate any questions that may arise. Learning is also enhanced by the active involvement of students. Tasks can be set and once again the tasks will vary according to the needs of the specific target group. Information Science students are, for example, asked to join the local online user group and to report back on its activities. Other examples of active involvement include the actual evaluation of databases or database programmes, reference interviews aimed at online searches and the evaluation of the study packages according to a set list of criteria. Activities that might be of interest to the other students include the analysis of information needs, formulation and adaptation of search strategies and the design of a data structure to meet their personal information needs. Although it will certainly enhance their understanding of the subject if they could practice the work on a computer, the use of videos and demonstrations can still enable them to master the basic principles — in their own time and in their own homes.

Experience has shown that although there are many methods of supplementing the teaching of online searching, nothing can replace the value of practical exercises on the real product. A workshop or a suitable alternative replacement (e.g. students completing their practical exercises on the CD-ROM network) is therefore still an important part of the training of online searching. The student should however be able to master the basic knowledge at home. He should practise basic skills by means of the set activities and monitor his progress by means of self-evaluation questions, and should also be evaluated by the teacher to ensure that he has mastered the theoretical work before attending the workshop.

The workshop can cover different methods of online searching such as CD-ROM searching, Sabinet searching, Internet searching and database design. The emphasis should be on the practical searches and on evaluating the research results and improving the search strategies. Theoretical knowledge of evaluation is insufficient; it should be based on actual experience with an online session. With a week of full day exposure to practical online searching they should, however, get the necessary experience to master online searching skills. The examples for the practical exercises should be based on the students' subject interest — a point which was strongly emphasised by the academic staff at Unisa.

A selection of media is used in the Unisa study packages, for example study guides and workbooks (e.g. for specific databases or database systems or database programmes such as Innmagic). Videos on online searching are recommended to students and a computer-assisted tutorial is used to teach search strategy formulation. There are also a number of computer-assisted tutorials available from specific database vendors that can be incorporated in the study package.

Methods for evaluating students are included such as assignments and projects. Evaluation before attending the practical session is especially important. The study package as such should also be evaluated. At Unisa, feedback is received from the Information Science students and from Unisa staff who attend workshops.

A final aspect to bear in mind for any distance teaching programme is that it is aimed at adult learners who are often also working full-time. Their needs, interests and the value of their time should be respected. They should also get the opportunity to apply their personal experience, for example by completing subject-related practical exercises and by designing personal databases. This implies that an adult teaching approach will be used.

8. Conclusion

Distance teaching offers valuable opportunities for the education of adult students unable to attend conventional classes. A multimedia study package would include the use of printed material as well as videos, computer-assisted tutorials, workshops and the Internet. The basic theoretical principles of online searching can be mastered before students attend practical sessions. The success of the programme does not lie in the combination of media only but in sound instructional design that will allow the needs of different target groups to be recognised and catered for. The characteristics of distance teaching and multimedia teaching approaches are of special importance. The programme should make allowances for the needs of people from developed as well as underdeveloped environments.

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